I CLAIMED:

1) A prime mover output control system, comprising

a) a mechanical load, connected to said prime mover for receiving rotating mechanical power therefrom, said mechanical load comprising a controllably adjustable torque requirement from said rotating mechanical power, and

b) a control mechanism connected to said mechanical load, comprising control over the controllably adjustable torque requirement to effect a resultant change of speed of said rotating mechanical power, and associated change of magnitude of mechanical power, whereby the prime mover power output may be controlled.

2) The system of claim **1** wherein said prime mover being of the type whose speed increases when its output torque is externally decreased, and vice versa, and whose power output generally increases when its speed increases due to externally decreased torque, and vice versa, and wherein the direction of said control over the controllably adjustable torque requirement being a:

a) decrease of the torque requirement of the mechanical load, to effect an increase of the power output of the prime mover, and

b) an increase of the torque requirement of the mechanical load, to effect a decrease of the power output of the prime mover.

3) The system of claim **2** wherein said control mechanism further comprising an input for receiving signals commanding a power output magnitude requirement.

4) The system of claim **3** wherein said control mechanism further comprising look-up tables comprising data related to torque requirement/prime mover power output relationships, or further comprising a calculator for calculating torque requirement/prime mover power output relationships; either of which for determining an ideal torque requirement to apply to said rotating mechanical power for the attainment of the power output magnitude requirement.

5) The system of claim **4** wherein said ideal torque requirement comprising the ideal torque requirement for the attainment of the power output magnitude

requirement in a single change of torque/speed relation.

6) The system of claim **5** wherein said mechanical load being a generator supplying power to an eventual recipient, and wherein said control mechanism comprising energy storage, for supplying the eventual recipient with its required power, substantially irrespective of prime mover output fluctuations caused by prime mover power output change.

7) The system of claim **5** wherein said mechanical load comprising an electrical generator supplying electricity to an eventual recipient, and wherein said control mechanism not comprising substantial electricity storage, whereby the eventual recipient receives power of a somewhat fluctuating nature during periods of power output change.

8) The system of claim **4** wherein said ideal torque requirement comprising a series of incremental torque requirements for application to the prime mover for the attainment of the power output magnitude requirement.

9) The system of claim **8** wherein said mechanical load comprising an electrical generator supplying electricity to an eventual recipient, and wherein said control mechanism not comprising electricity storage, whereby the eventual recipient receives power of a somewhat fluctuating nature during periods of power output change; and wherein said ideal torque requirements comprising torque requirements that cause a power output change that the eventual recipient will not be substantially adversely affected by.

10) The system of claim **2** wherein said mechanical load having dynamically unstable equilibrium with prime mover output, and wherein said control mechanism further for stopping said resultant change of magnitude of said rotating mechanical power, said control mechanism comprising

a) a sensor, or
b) a calculator, or
c) a combination of sensor and calculator; for determining the torque output of said prime mover at the attainment of a required power output, and
d) a predetermined response to the attainment of the prime mover of a required power output, of the application of the determined torque

output, to said rotating mechanical power.

11) The system of claim **2** wherein said control mechanism comprising variable mechanical advantage coupling between said prime mover and said mechanical load.

12) The system of claim **2** wherein said mechanical load comprising a variable displacement pump and wherein said control mechanism comprising

a) a displacement adjuster, for varying the torque requirement of the mechanical load, and
b) no power output controlling throttle.

13) The system of claim **2** wherein said mechanical load being a generator supplying power to an electrical load, and wherein said control mechanism comprising electronic components for the adjustment of the current drawn from the generator, to effect control over the torque requirement of the generator.

14) The system of claim **13** wherein said electronic components comprising a power electronic converter having an input connected to said generator and an output connected to the electrical load, said power electronic converter for controlling the current draw of its own input, to effect control over current draw from the generator, and thereby the torque requirement of the generator.

15) The system of claim **14** wherein said generator comprising a direct current generator and wherein said power electronic converter having control over its own input voltage versus current characteristics to control the current draw from the generator, and thereby the torque requirement of the generator.

16) The system of claim **14** wherein said generator being an alternating current synchronous permanent magnet machine and wherein said power electronic converter having control over its own input voltage versus current characteristics to control the current draw from the generator, and thereby the torque requirement of the generator.

17) The system of claim **14** wherein said generator being an alternating current synchronous permanent magnet machine and wherein said power electronic converter having control over the frequency of its input to control the current draw from the generator, and thereby the torque requirement of the generator.

18) The system of claim **14** wherein said generator being an alternating current synchronous externally excited machine having fixed excitation, and wherein said power electronic converter having control over its input voltage versus current characteristics to control the current draw from the generator, and thereby the torque requirement of the generator.

19) The system of claim **14** wherein said generator being an alternating current synchronous externally excited machine having fixed excitation, and wherein said power electronic converter having control over the frequency of its input to control the current draw from the generator, and thereby the torque requirement of the generator.

20) The system of claim **14** wherein said generator being an alternating current induction machine and wherein said power electronic converter having control over the frequency of its input to control the current draw from the generator, and thereby the torque requirement of the generator.

21) The system of claim **14** wherein said power electronic converter having positive incremental resistance over part of all of its operating range.

22) The system of claim **21** wherein said power electronic converter having

a) a threshold voltage below which little or no current is drawn from said generator, and above which a steeply increasing current is drawn from said generator, and
b) a threshold voltage adjuster for controlling the current draw of the generator output.

23) The system of claim **22** wherein said control mechanism further having an input for receiving signals to change the power output of the system, said input sampled for said threshold voltage adjuster for adjusting the

threshold voltage based upon said input, whereby said torque requirement and hence the speed and power output of the system may be changed in response to a requirement.

24) The system of claim **23** wherein the direction of the control over the controllably adjustable torque requirement of a decrease of the torque requirement of the mechanical load, being an increase of said threshold voltage, and wherein the direction of the control over the controllably adjustable torque requirement of an increase of the torque requirement of the mechanical load, being a decrease of said threshold voltage.

25) The system of claim **14** wherein said power electronic converter being a boost converter, a switching element whereof having control over the current/voltage relationship of the generator electrical output, whereby the current of the generator output and the torque requirement of the generator being controllable.

26) The system of claim **2** wherein said mechanical load being a generator supplying power to an electrical load and wherein said control mechanism comprising variable resistance connected to the output of the generator, for the control over the current draw from the generator, whereby the torque requirement of the generator being controlled.

27) The system of claim **26** wherein said generator being a direct current machine.

28) The system of claim **26** wherein said generator being an alternating current machine.

29) The system of claim **26** wherein said variable resistance comprising one or more variable resistors.

30) The system of claim **26** wherein said variable resistance comprising a plurality of fixed resistance resistors, and wherein said control mechanism comprising switches for switching different resistors in and out of circuit for the creation of desired resistance.

31) The system of claim **30** wherein said variable resistors comprising variable resistance heaters.

32) The system of claim **2** wherein said mechanical load comprising an electrical generator, supplying power to an electrical load, and having controllably adjustable excitation, and wherein said control mechanism comprising control over the generator excitation and thereby control over the torque requirement of the generator.

33) The system of claim **32** wherein said control mechanism comprising control over the synchronous speed versus torque characteristics of the generator

34) The system of claim **33** wherein said generator being a direct current independent wound commutated machine.

35) The system of claim **33** wherein said generator being a direct current independent wound brushless machine.

36) The system of claim **33** wherein said generator being a direct current permanent magnet brushless machine.

37) The system of claim **33** wherein said generator being an alternating current synchronous machine.

38) The system of claim **33** wherein said generator being an alternating current induction machine, and wherein said control mechanism comprising a quadrature current controller for varying the supply of quadrature current to the induction machine.

39) The system of claim **1** further comprising energy storage and wherein said mechanical load comprising:

a) a generator, and
b) at least one power electronic converter, and
c) an electrical load, and
d) energy storage

wherein said at least one power electronic converter having an input from said generator and being configured to control the electrical

current of said input; thereby controlling the torque requirement of the mechanical load; and wherein said at least one converter having an output to said energy storage for providing it with energy.

40) The system of claim **39** further comprising a power electronic converter having an input connected to said energy storage and an output connected to said electrical load, for controllably supplying power to said load.

41) The system of claim **40**, wherein said energy storage being a battery.

42) The system of claim **41**, wherein said generator being a direct current or rectified alternating current generator, and wherein said battery having a higher voltage than the output of the generator, and wherein said at least one power electronic converters comprising a boost converter located between the generator and the battery.

43) The system of claim **41**, wherein said generator being a direct current or rectified alternating current generator, and wherein said battery having a lower voltage than the output of the generator, and wherein said at least one power electronic converters comprising a buck converter located between the generator and the battery.

44) The system of claim **39** further including a sensor for determining the position of said prime mover with respect to its power output cycle, said sensor having an output sampled by said at least one power electronic converter, said at least one power electronic converter being configured to command a supply of electrical power from said energy storage to said generator to cause the generator to transition to motor action, during the cyclic periods in which the prime mover is engaged in substantially power absorbing strokes.

45) The system of claim **44** wherein said sensor being a rotary angle transducer.

46) The system of claim **44** wherein said sensor being a piston position sensor.

47) The system of claim **39**, wherein said generator being a brush commutated direct current generator or a brushless direct current motor modified with suitable backdiodes so as to be capable of generator operation and wherein said at least one power electronic converters comprising

a) the capability to source power from said energy storage, and

b) current versus voltage input characteristics that cause the automatic transition of generator to motor action and vice versa, around voltages related to converter input voltage,

whereby the generator automatically transitions to motor action during reduced voltage periods that occur when the prime mover is engaged in substantially non power-producing periods.

48) The system of claim **47**, wherein the power electronic power sourcing load is a combination boost and buck converter located between the generator and energy storage.

49) The system of claim **39**, wherein said at least one power electronic converter comprising the current versus voltage characteristics which cause the dynamic reduction of generator current during periods of reduced generator voltage, whereby the generator and converter combination act as an electronic flywheel to the prime mover.

50) The system of claim **39** wherein said at least one power electronic converters comprising a receptor for receiving signals to start said system, and being configured to respond to such signals with the synthesis of suitable current and voltage characteristics for the removal of power from the energy storage to the generator, whereby causing said generator to act as a starting motor to the prime mover.

51) The system of claim **50** wherein said generator being a brush commutated direct current generator.

52) The system of claim **50** wherein said generator being a brushless direct current motors modified with suitable backdiodes so as to be capable of generator operation.

53) The system of claim **50** wherein said generator being a rectified alternating current generator and wherein said power electronic converter being a variable frequency power electronic converter.

54) The system of claim **1** wherein said mechanical load comprising:

a) a generator, supplying electricity to an electrical load, and

b) energy storage, connected to the output of said generator and the input of the electrical load via suitable conversion means, and

c) generator excitation control, being configured to control the synchronous speed versus torque characteristics of the generator; thereby controlling the torque requirement of the mechanical load and controlling the prime mover speed and power output.

55) The system of claim **54** wherein said generator being an alternating current generator and capable of acting as a motor, and wherein said generator excitation control comprising

a) adjustable frequency generator excitation current, and

b) power electronic converters, located between said generator and said energy storage for the sourcing and sinking of power for the accommodation of excitation frequency adjustment.

56) The system of claim **55** wherein said generator excitation control further comprising

a) an input for receiving signals to start said system,

b) programmed response to said signals comprising:

One) increase of excitation frequency from zero, and

Two) supply of suitably synthesized current by said power electronic converters from said energy storage;

whereby said generator excitation control may start said prime mover.

57) The system of claim **54** wherein said generator being an induction motor capable of acting as a generator, and wherein said generator excitation control comprising an adjustable frequency inverter providing adjustable quadrature excitation current to the generator.

58) The system of claim **57** wherein said generator excitation control comprising:

a) means to source current from said energy storage to power said generator as a motor, and

b) permitting the natural generator to motor transition during cyclic power output changes of the prime mover,

whereby the generator acs as a motor during periods of substantially reduced prime mover torque output.

59) The system of claim **58** wherein said generator replaces a flywheel of the prime mover.

60) The system of claim **58** wherein said generator excitation control further comprising

a) an input for receiving signals to start said system,

b) inverter frequency increase as a response to said signals, and

c) electronic converters connected between said generator and said energy storage, for supplying operating power to said generator, whereby said system may be started.

61) The system of claim **57** wherein said generator excitation control further comprising

a) an input for receiving signals to start said system,

b) means to increase inverter frequency in response to said signals, and

c) power electronic converters connected between said generator and said energy storage, for supplying operating power to said generator; whereby said prime mover may be started.

62) The system of claim **1** further comprising energy storage and wherein said mechanical load comprising:

a) an alternating current generator, and

b) at least one power electronic converter, and

c) an electrical load, and

wherein said at least one power electronic converter having an input from said generator and being configured to control the frequency of said input; thereby controlling the torque requirement of the mechanical load; and wherein said at least one converter having an output to said energy storage for providing it with power.

63) The system of claim **62** further comprising a power electronic converter having an input connected to said energy storage and an output connected to said electrical load for supplying power to the electrical load at substantially the electrical requirements of the electrical load.

64) The system of claim **63**, wherein said energy storage being a battery.

65) The system of claim **64** wherein said at least one converters comprising an inverter followed by a boost converter.

66) The system of claim **62** further including
a sensor for determining the position of said prime mover with respect to its power output cycle, said sensor having an output, and wherein said at least one power electronic converters comprising
a) power sourcing ability, and
b) an input for sampling the output of said sensor, and
c) programmed response to a sensor output of low or zero prime mover power output, with a frequency decrease that causes the generator to transition to motor action.

67) The system of claim **66** wherein said sensor is a rotary angle transducer.

68) The system of claim **67** wherein said sensor is a piston position sensor.

69) The system of claim **62**, wherein said generator being a brush commutated direct current generator or a brushless direct current motor modified with suitable backdiodes so as to be capable of generator operation and wherein said at least one power electronic converters comprising
a) the ability to source power from said energy storage, and
b) input frequency characteristics that cause the automatic transition of generator to motor action and vice versa, around the frequency of the converter input,
whereby the generator automatically or naturally transitions to motor action during reduced frequency periods that occur when the prime

mover is engaged in substantially non power-producing periods.

70) The system of claim **69** wherein said generator is an induction generator.

71) The system of claim **62**, wherein said at least one power electronic converter comprising the frequency characteristics which cause the dynamic reduction of generator current during periods of reduced generator frequency, whereby the generator and converter combination act as an electronic flywheel to the prime mover.

72) The system of claim **62** wherein said generator is capable of acting as a motor, and wherein said at least one power electronic converters comprising

a) an input from said energy storage, and
b) an output to said generator, and
c) control over the frequency of electrical current from said energy storage to said generator to enable the powering of said generator as a motor and,
d) a receptor for receiving a signal during a time-period when said generator is not operational, to power said generator as a motor, whereby said generator may be powered as a starting motor to the prime mover.

73) The system of claim **69** wherein said prime mover if a heat engine comprising a startup heat source, and wherein said at least one power electronic converters comprising

a) power sourcing ability, and
b) a receptor for receiving a signal to start said system, and
c) programmed response to said signal with the synthesis of suitable electrical frequency for causing the generator to act as a motor from zero speed to move said prime mover,

whereby said generator may be powered as a starting motor to the prime mover.

74) The system of claim **1** further comprising energy storage and wherein said mechanical load comprising a generator, supplying power to an electrical load, and wherein said control mechanism comprising an

adjustable resistance control, having an input from said generator and being configured to control the electrical current of the input; thereby controlling the torque requirement of the mechanical load; and wherein said control mechanism having an output to said energy storage for providing it with energy.

75) The system of claim **74** further comprising a power electronic converter, having an input connected to said energy storage, and an output connected to said electrical load and having control over the conversion of power from the energy storage to the electrical load to substantially the electrical requirements of the electrical load.

76) The system of claim **75**, wherein said energy storage being a battery.

77) The system of claim **75** further comprising;

a) a sensor for sensing the position of the prime mover with regard to prime mover power producing cycle, and for outputting signals representant thereof, and wherein said resistive converter comprising:

b) a sampler for sampling the output of said sensor, and

c) a dynamic resistance increase during prime mover substantially non-power producing cyclic portions,

whereby the torque requirement of the mechanical load is reduced when the prime mover is producing less torque.

78) An apparatus for the conversion and regulation of power, comprising:

a) a prime mover for the production of variable rotary mechanical power, and

b) a power converter, connected to said prime mover, said power converter for applying a torque to a transmission between said prime mover and itself, and for regulating that torque application, said power converter further having an input for receiving signals commanding variations in said torque application,

and wherein said prime mover having a speed substantially affected by the torque application of the power converter to the transmission, and

c) a power recipient, connected to said power converter, and

d) a well-defined relationship between the torque application of the power converter and the speed of the prime mover, whereby allowing for the regulation of the speed, and thereby of the power output, of the prime mover, by the regulation of the torque application of the power converter.

79) The apparatus of claim **78** wherein said power converter comprising a generator for converting said variable rotary mechanical power to variable electrical power, and a power electronic converter, having control over its own input current, and whereby regulation over the torque application of the generator to the transmission.

80) The apparatus of claim **79** wherein said power recipient comprising an energy storage medium and an electrical load.

81) The apparatus of claim **80** further comprising a signal generator for generating signals regarding the state of charge of said energy storage medium; said signals for receipt by said power electronic converter as commanding changes of the torque application to the transmission.

82) The apparatus of claim **81** wherein said power electronic converter is configure to command a power output decrease by causing a prime mover deceleration, by increasing its own input current from the generator; to command a power output increase by causing a prime mover acceleration, by decreasing its own input current from the generator; and to command a sustained power output by maintaining its own input current.

83) The apparatus of claim **82** wherein said generator being configured to also act as a motor, and having access to an electrical power source, which may comprise said energy storage medium; and wherein said power converter also for achieving a power output increase by causing prime mover acceleration by sourcing current from said electrical power source and supplying said sourced current to the generator, whereby causing the generator to apply a torque to the transmission in the direction of rotation and aiding prime mover acceleration.

84) The apparatus of claim **83** further for starting said prime mover.

85) The apparatus of claim **83** wherein said generator having a relationship with said power electronic converter, wherein a small generator output voltage increase being related to a subsequent large increase in power electronic converter input current, whereby causing prime mover deceleration, and a small generator output voltage decrease being related to a subsequent large decrease in power electronic converter input current or even a supply of current to said generator from said energy storage medium, whereby causing prime mover acceleration, whereby stabilizing the prime mover and generator.

86) The apparatus of claim **85**, wherein said prime mover being of the type that dos not contain a flywheel, wherein generator output voltage reductions, caused by the prime mover's involvement in non-power producing portions of its power production cycle, cause subsequent large decreases in power electronic converter input current or even a supply of current to said generator from said energy storage medium, whereby acting as an electronic flywheel.

87) The apparatus of claim **86** wherein said prime mover being a single cylinder diesel engine and said generator being an induction machine configured to act as both a generator and a motor.

88) The apparatus of claim **83** further comprising a sensor for determining when the prime mover is in a substantially non-power producing portion of its power producing cycle, and for commanding a signal to said power electronic converter to dynamically decrease its input current or to even supply current to said generator from said energy storage medium during such involvement, whereby causing the generator to act as an electronic flywheel.

89) The apparatus of claim **83** wherein said generator having a relationship with said power electronic converter, wherein a small generator output frequency increase being related to a subsequent large increase in power electronic converter input current, whereby causing prime mover deceleration, and a small generator output frequency decrease being related to a subsequent large decrease in power electronic converter input current or even a supply of current to said generator from said energy storage medium, whereby causing prime mover acceleration, whereby

stabilizing the prime mover and generator.

90) The apparatus of claim **89**, wherein said prime mover being of the type that does not contain a flywheel, wherein generator output frequency reductions, caused by the prime mover's involvement in non-power producing portions of its power production cycle, cause subsequent large decreases in power electronic converter input current or even a supply of current to said generator from said energy storage medium, whereby acting as an electronic flywheel.

91) The apparatus of claim **90** wherein said prime mover being a single cylinder diesel engine and said generator being an induction machine configured to act as both a generator and a motor.

92) The apparatus of claim **83** wherein said generator being a synchronous machine configured to act as both a generator and a motor.

93) The apparatus of claim **83** wherein said generator being an automotive alternator.

94) The apparatus of claim **78** wherein said power converter comprising a generator having variable excitation; the regulation of said excitation providing regulation of the torque application of the generator to the transmission with the prime mover.

95) The apparatus of claim **94** wherein the speed of the prime mover being substantially affected by the torque application of the generator to the transmission in the following manner: a generator excitation increase causing a prime mover deceleration and a generator excitation decrease causing a prime mover acceleration.

96) The apparatus of claim **95** wherein said power recipient comprising an energy storage medium and an electrical load.

97) The apparatus of claim **96** further comprising a signal generator for generating signals regarding the state of charge of said energy storage medium; said signals for being received by said power electronic converter

as commanding changes of the torque application to the transmission.

98) The apparatus of claim **97** wherein said generator being configured to also act as a motor, and having access to an electrical power source which may comprise said energy storage medium, and wherein said power converter also for achieving a power output increase by causing prime mover acceleration by reducing the excitation of the generator to below the synchronous speed and sourcing current from said electrical power source, to the generator, whereby causing the generator to apply a torque to the transmission in the direction of rotation, and aiding prime mover acceleration.

99) The apparatus of claim **98** further for starting the prime mover.

100) The apparatus of claim **98** wherein said generator having a relationship with said energy storage medium allowing for torque application reductions to the transmission or even generator-to-motor transitioning around the synchronous speed, during periods of reduced speeds.

101) The apparatus of claim **100** wherein said periods of reduced speeds being related to power output reductions of the prime mover being involved in reduced-power producing portions of its power output cycle.

102) The apparatus of claim **101** wherein said prime mover being a single cylinder engine and said generator being an induction machine configured to act as both a generator and a motor.

103) The apparatus of claim **98** wherein said generator being a synchronous generator configured to also act as a motor.

104) The apparatus of claim **98** wherein said generator being an automotive alternator.

105) A method for controlling the output of a prime mover, comprising adjusting a torque load on said prime mover in the following fashion:

a) during periods of operation wherein the power output of the prime mover is to be reduced, causing the torque load on the prime mover to be greater than the torque output of said prime mover,

b) during periods of operation wherein the power output of the prime mover is to be increased, causing the torque load on the prime mover to be less than the torque output of the prime mover.

106) The method of claim **105** wherein said method further comprising the step of

c) during periods of operation wherein the power output of said prime mover is equal to the desired power output, maintaining the torque load on the prime mover in equilibrium with the torque output of said prime mover.

107) The method of claim **105** further comprising the step of

d) determining the substantially exact torque load at which a dynamically unstable prime mover will maintain a required power output, and

e) stopping the dynamically unstable prime mover from changing speed by applying the substantially exact torque load to the prime mover upon the substantial achievement by the prime mover of the speed needed for the required power output.

108) The method of claim **105** further comprising the step of

f) receiving signals signalling the amount by which a torque load on said prime mover is to be adjusted, and wherein said steps (a) and (b) comprising adjusting the torque load according to said signals.

109) The method of claim **105** further comprising the step of

g) receiving signals signalling the periods in which prime mover power output is to be reduced and signals signalling the periods in which prime mover power output is to be increased.

110) The method of claim **105** wherein step (a) of causing the torque load on the prime mover to be greater than the torque output of said prime mover is accomplished by applying a predetermined torque load increment as many times as necessary until the torque load being greater than the torque output of the prime mover; and wherein step (b) of causing the torque load

on the prime mover to be less than the torque output of said prime mover is accomplished by applying a predetermined torque load decrease as many times as necessary until the torque load being less than the torque output of the prime mover.

111) The method of claim **105** further comprising

h) receiving signals regarding a required prime mover power output, and

i) sampling the difference between prime mover power output and a required prime mover power output, and

j) determining a torque load to apply to said prime mover which would effect the required prime mover power output, and

k) applying the determined torque load in steps (i), (ii) and (iii).

112) The method of claim **111** wherein said step (i) comprising applying the determined torque load in a single application in steps (i), (ii) and (iii).

113) The method of claim **111** wherein step (i) comprising applying the determined torque load in a number of small stages of changed torque load, in steps (i), (ii) and (iii).

114) The method of claim **111** further comprising the step of

l) buffering the power supply to an eventual recipient of said prime mover power output during periods of power output change, so that it is not substantially adversely affected by power fluctuations during periods of power output change.

115) The method of claim **111** further comprising the step of

m) sourcing and sinking and converting power between the prime mover and an eventual recipient of the power output of said prime mover to provide the eventual recipient with power according to the required characteristics of the eventual recipient.

116) The method of claim **111** further not comprising the step of

n) substantially buffering the power supply to an eventual recipient of said prime mover power output during periods of power output change, whereby the eventual recipient may receive power of a somewhat fluctuating nature during periods of power output change.

117) The method of claim **105** wherein said steps of increasing and decreasing the torque of the mechanical load are done by varying a transmission between the prime mover and the mechanical load.

118) The method of claim **105** wherein said steps (i) and (ii) of causing the torque load to be greater than and smaller than the torque output of the prime mover are accomplished by altering the mechanical coupling of a mechanical load being supplied with mechanical power by said prime mover, in a required direction and by a required amount.

119) The method of claim **118** wherein said mechanically coupled load being a variable displacement pump and wherein said altering of the mechanical coupling comprising varying the displacement of the pump.

120) The method of claim **105** wherein said steps of causing the torque load to be greater than, and less than the torque output of said prime mover, result from varying the torque versus speed characteristics of a load.

121) The method of claim **120** wherein the method of varying a torque versus speed characteristics of a load comprising varying the resistance of an electrical load receiving power from said generator.

122) The method of claim **121** wherein step (a) comprising increasing the resistance of the electrical load, and wherein step (b) comprising decreasing the resistance of the electrical load.

123) The method of claim **122** further comprising supplying an eventual electrical recipient of the output of the prime mover, with power from an auxiliary source, and sinking power thereto, during periods of power fluctuations due to prime mover speed.

124) The method of claim **123** further comprising the step of supplying power to the auxiliary source during prime mover operation.

125) The method of claim **122** further comprising the steps of

o) sensing or determining when the prime mover is engaged in a section of its power output cycle in which it is substantially not producing power, and,

p) dynamically increasing the resistance when the prime mover is so engaged, whereby dynamically reducing the torque load on the prime mover.

126) The method of claim **125** wherein said step (xv) comprising transducing the rotary angle of the prime mover

127) The method of claim **125** wherein said step (xv) of sensing comprising sensing piston position of the prime mover.

128) The method of claim **120** wherein the torque versus speed characteristic being varied by the step of

q) varying the current versus voltage characteristics of the input to an electrical load that is receiving power from a generator that is providing the torque load on the prime mover.

129) The method of claim **128** wherein said varying the current versus voltage characteristics of the input to an electrical load, comprising

r) not allowing much or any current to flow to the electrical load below a generator voltage threshold, and

s) at voltages above the generator voltage threshold, allowing a steeply increasing current/voltage ratio to flow to the electrical load, and,

t) adjusting the height of the generator voltage threshold to increase and to decrease the electrical current allowed to flow to the electrical load, in the attainment of steps (i) and (ii).

130) The method of claim **129** wherein said step (xix) further comprising the step of

u) steeply decreasing the current flow to the electrical load substantially immediately following any drop in generator voltage, whereby stabilizing the generator, and acting as an electronic flywheel.

131) The method of claim **129** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

v) receiving a command to begin outputting power, and,

w) synthesizing electricity of suitable voltage and current characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

132) The method of claim **129** wherein further comprising the steps of

x) sourcing power from an auxiliary power supply, and

y) providing current versus voltage characteristics that cause the automatic transition of generator to motor action when the voltage of the power produced by the generator is reduced due to the prime mover having being engaged in a portion of its power producing cycle in which it produces substantially no power.

133) The method of claim **132** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

z) sampling an input commanding system startup, and, upon receipt of a command to start system,

aa) synthesizing electricity of suitable voltage and current characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

134) The method of claim **133** further comprising the step of

bb) employing a combination boost and buck converter to provide electrical conversion in steps (xvii), (xxiv), (xxv), and (xxvii).

135) The method of claim **120** wherein the torque versus speed characteristic of a load being varied by the step of

cc) varying the frequency of the input to an electrical load that is receiving power from a generator that is providing the torque load on the prime mover.

136) The method of claim **135** wherein said step of varying the frequency comprising

dd) not allowing much or any current to flow to the load below a generator frequency threshold, and

ee) above the generator frequency threshold, increasing the current flow to the load steeply with generator frequency increase, and

ff) adjusting the level of the generator frequency threshold to increase and to decrease the electrical current flow to the load, to cause the torque load to be increased and decreased, in steps (i) and (ii).

137) The method of claim **136** further comprising the step of:

gg) decreasing the current flow to the load steeply with slight generator frequency decrease, below the generator frequency threshold, whereby acting as an electronic flywheel to the prime mover.

138) The method of claim **135** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

hh) sampling an input commanding system startup, and, upon receipt of a command to start system,

ii) synthesizing electricity of suitable electrical characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

139) The method of claim **135** wherein further comprising the step of

jj) sourcing power from an auxiliary power supply, and

kk) providing frequency characteristics that cause the automatic transition of generator to motor action when the voltage of the power produced by the generator is reduced due to the prime mover having being engaged in a portion of its power producing cycle in which it produces substantially no power.

140) The method of claim **139** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

ll) sampling an input commanding system startup, and, upon receipt of a command to start system,

mm) synthesizing electricity of suitable voltage and current characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

141) The method of claim **140** further comprising the step of

nn) employing a combination boost and buck converter to provide electrical conversion in steps (xvii), (xxiv) and (xxv) and (xxvii).

142) The method of claim **120** wherein said step of varying the torque versus speed characteristic of a load, comprising adjusting the excitation of a generator that is powered by said prime mover, to attain steps (i) and (ii).

143) The method of claim **142**, wherein said method further comprising

oo) receiving signals commanding a required prime mover power output, and

pp) determining a required level of generator excitation for executing the torque load which would cause the prime mover to move to the required power output, and

wherein said step of adjusting the excitation of a generator comprising

qq) applying the determined level of generator excitation.

144) The method of claim **142** wherein said method further comprising

rr) receiving signals commanding an increase in prime mover output, and

ss) reducing the generator excitation, to cause an increase in prime mover output, and

tt) receiving signals commanding a decrease in prime mover output, and

uu) increasing the generator excitation to cause a decrease in prime mover output.

145) The method of claim **144** wherein said step (xlv) comprising

vv) reducing the generator excitation to below the synchronous speed of the generator, where the generator is one that is capable of acting as a motor,

and wherein said method further comprising the step of

ww) sourcing power from an auxiliary power supply, whereby causing the generator to act as a motor.

146) The method of claim **145** further comprising employing the generator as a starter motor for said prime mover.

147) The method of claim **145** further comprising the step of charging the auxiliary power supply during operation.

148) The method of claim **146** further comprising the step of diverting excess produced during prime mover power output decreasing periods, to said auxiliary power supply.

149) The method of claim **144** wherein said generator being an induction machine, and said steps (xlv) and (xlvii) involve respectively reducing and increasing the quadrature current supplied to the induction machine.

150) The method of claim **149** wherein said step (xlv) comprising

xx) reducing the quadrature current supplied to the induction machine, to cause the operating speed to be below the synchronous speed of the prime mover-generator combination, where the generator being configured to be capable of acting as a motor,

and wherein said method further comprising the step of

yy) sourcing power from an auxiliary power supply, whereby causing the generator to act as a motor.

151) The method of claim **150** further comprising employing the generator as a starter motor for said prime mover.

152) The method of claim **150** further comprising

zz) sensing when the prime mover is involved in a substantially non-power producing section of its power production cycle, and,

aaa) reducing the quadrature current to below the synchronous speed of the prime mover-generator combination, during periods when the prime mover is producing substantially no power other than inertia, whereby causing the generator to power the prime mover during non-power producing periods of the prime mover.

153) The method of claim **152** further comprising employing the generator as a starter motor for said prime mover.

154) The method of claim **150** further comprising the step of

bbb) permitting the natural induction machine generator to motor transition during power output cyclic variations of the prime mover, whereby the generator may act as a motor during periods of low or zero power outputs of the prime mover.

155) The method of claim **154**, further comprising the step of employing the generator as a starter motor for said prime mover.

156) A method for controlling the output of a prime mover comprising

a) allowing the prime mover to vary its intake and speed and output due to variations of its torque load, and

b) receiving signals regarding a required power output increase; and,

c) adjusting the torque load on the prime mover so as to enable the required power output increase, and,

d) receiving signals regarding a required power output decrease; and,

e) adjusting the torque load on the prime mover so as to enable the required power output decrease.

157) The method of claim **156** wherein said method further comprising the step of

f) during periods of operation wherein the power output of said prime mover is equal to the desired power output, maintaining the torque load on the prime mover in equilibrium with the torque output of said prime mover.

158) The method of claim **156** further comprising the step of

g) determining the substantially exact torque load at which a dynamically unstable prime mover will maintain a required power output, and

h) stopping the dynamically unstable prime mover from changing speed by applying the substantially exact torque load to the prime mover upon the substantial achievement by the prime mover of the speed needed for the required power output.

159) The method of claim **156** further comprising the step of

i) receiving signals signalling the amount by which a torque load on said prime mover is to be adjusted, and wherein said steps (c) and (e) comprising adjusting the torque load according to said signals.

160) The method of claim **156** wherein said step (c) comprising decreasing the torque load upon said prime mover, and wherein, said step (e) comprising increasing the torque load upon said prime mover.

161) The method of claim **160** wherein step (c)of causing the torque load on the prime mover to be greater than the torque output of said prime mover is accomplished by applying a predetermined torque load increment as many times as necessary until the torque load being greater than the torque output of the prime mover; and wherein step (e) of causing the torque load on the prime mover to be less than the torque output of said prime mover is accomplished by applying a predetermined torque load decrease as many times as necessary until the torque load being less than the torque output of the prime mover.

162) The method of claim **156** further comprising

j) sampling the difference between the actual power output of the prime mover, and a required prime mover power output, and

k) determining a torque load to apply to said prime mover which would effect the required prime mover power output, and wherein said steps (c) and (e) comprising applying the determined torque load.

163) The method of claim **162** wherein said step (k) comprising applying the determined torque load in a single application in (c) and (e).

164) The method of claim **162** wherein steps (c) and (e)comprising applying the determined torque load in a number of small stages of changed torque load.

165) The method of claim **162** further comprising the step of

l) buffering the power supply to an eventual recipient of said prime mover power output during periods of power output change, so that it is not substantially adversely affected by power fluctuations during

periods of power output change.

166) The method of claim **162** further comprising the step of

m) sourcing and sinking and converting power between the prime mover and an eventual recipient of the power output of said prime mover to provide the eventual recipient with power according to the required characteristics of the eventual recipient.

167) The method of claim **162** further not comprising the step of

n) substantially buffering the power supply to an eventual recipient of said prime mover power output during periods of power output change, whereby the eventual recipient may receive power of a somewhat fluctuating nature during periods of power output change.

168) The method of claim **156** wherein said steps of adjusting the torque load on the prime mover are done by varying a transmission between the prime mover and a mechanical load.

169) The method of claim **156** wherein said steps of adjusting the torque load on the prime mover result from varying the torque versus speed characteristics of a load upon said prime mover.

170) The method of claim **169** wherein the method of varying a torque versus speed characteristics of a load comprising varying the resistance of an electrical load receiving power from said generator.

171) The method of claim **170** wherein step (c) comprising increasing the resistance of the electrical load, and wherein step (e) comprising decreasing the resistance of the electrical load.

172) The method of claim **171** further comprising supplying an eventual electrical prime mover power output recipient with power from an auxiliary source , and sinking power thereto, during power fluctuations caused by an adjusted torque load

173) The method of claim **172** further comprising the step of supplying power to the auxiliary source during prime mover operation.

174) The method of claim **173** further comprising the steps of

o) sensing or determining when the prime mover is engaged in a section of its power output cycle in which it is substantially not producing power, and

p) dynamically increasing the resistance when the prime mover is so engaged, whereby dynamically reducing the torque load on the prime mover.

175) The method of claim **169** wherein the torque versus speed characteristic being varied by the step of

q) varying the current versus voltage characteristics of the input to an electrical load that is receiving power from a generator that is providing the torque load on the prime mover.

176) The method of claim **175** wherein said varying the current versus voltage characteristics of the input to an electrical load, comprising

r) not allowing much or any current to flow to the electrical load below a threshold voltage, and

s) at voltages above the threshold voltage, causing a steeply increasing current ratio to flow to the electrical load, and,

wherein said steps c) and e) comprising adjusting the level of the threshold voltage.

177) The method of claim **176** wherein said step (s) further comprising the step of

t) steeply decreasing the current flow to the electrical load substantially immediately following any drop in generator voltage, whereby stabilizing the generator, and acting as an electronic flywheel.

178) The method of claim **176** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

u) sampling an input commanding system startup, and, upon receipt of a command to start system, employing step (c), wherein step (c) comprising:

v) synthesizing electricity of suitable voltage and current characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

179) The method of claim **176** wherein further comprising the steps of

w) sourcing power from an auxiliary power supply, and

x) providing current versus voltage characteristics that cause the automatic transition of generator to motor action when the voltage of the power produced by the generator is reduced due to the prime mover having being engaged in a portion of its power producing cycle in which it produces substantially no power.

180) The method of claim **179** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

y) sampling an input commanding system startup, and, upon receipt of a command to start system,

z) synthesizing electricity of suitable voltage and current characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

181) The method of claim **180** further comprising the step of

aa) employing a combination boost and buck converter to provide electrical conversion in steps (c), (e), (x) and (z).

182) The method of claim **169** wherein the torque versus speed characteristic of a load being varied by the step of

bb) varying the frequency of the input to an electrical load that is receiving power from a generator that is providing the torque load on the prime mover.

183) The method of claim **182** wherein said step of varying the frequency comprising

cc) not allowing much or any current to flow to the electrical load below a generator frequency threshold, and

dd) above the generator frequency threshold, increasing the current flow to the electrical load steeply with generator frequency increase, and wherein steps (c) and (e) comprising

ee) adjusting the level of the generator frequency threshold to control the electrical current flow to the electrical load, whereby adjusting the torque load on the prime mover.

184) The method of claim **183** further comprising the step of

ff) determining when the prime mover is engaged in substantially non-power producing strokes of its power output cycle, and, during such engagement, employing step (c), wherein said step (c) comprising

gg) decreasing the current flow to the electrical load steeply, whereby acting as an electronic flywheel to the prime mover.

185) The method of claim **182** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

hh) sampling an input commanding system startup, and, upon receipt of a command to start system,

ii) synthesizing electricity of suitable electrical characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

186) The method of claim **182** wherein further comprising the step of

jj) sourcing power from an auxiliary power supply, and

kk) providing frequency characteristics that cause the automatic transition of generator to motor action when the voltage of the power produced by the generator is reduced due to the prime mover having being engaged in a portion of its power producing cycle in which it produces substantially no power.

187) The method of claim **186** further comprising the step of starting the prime-mover and generator, where the generator is of the type that can operate as a motor, comprising the steps of:

ll) sampling an input commanding system startup, and, upon receipt of a command to start system,

mm) synthesizing electricity of suitable voltage and current characteristics from an auxiliary energy supply so as to cause the generator to start rotating, and to rotate the prime mover.

188) The method of claim **169** wherein said step of varying the torque versus speed characteristic of a load, comprising adjusting the excitation of a generator that is powered by said prime mover, to attain steps a) and b).

189) The method of claim **188**, wherein said method further comprising
nn) determining a required level of generator excitation which would achieve a torque load that would cause the prime mover to move to the required power output, and
wherein said steps (c) and (e) comprising
oo) applying the determined level of generator excitation.

190) The method of claim **188** wherein said step c) comprising
pp) reducing the generator excitation, to cause an increase in prime mover output, and
i) wherein said step (e) comprising
qq) increasing the generator excitation to cause a decrease in prime mover output.

191) The method of claim **190** wherein said step (pp) comprising
i) reducing the generator excitation to below the synchronous speed of the generator, where the generator is one that is capable of acting as a motor,
and wherein said method further comprising the step of
rr) sourcing power from an auxiliary power supply, whereby causing the generator to act as a motor.

192) The method of claim **191** further comprising employing the generator as a starter motor for said prime mover.

193) The method of claim **191** further comprising the step of charging the auxiliary power supply during operation.

194) The method of claim **193** further comprising the step of diverting excess produced during prime mover power output decreasing periods, to said auxiliary power supply.

195) The method of claim **190** wherein said generator being an induction machine, and said steps (pp) and (qq) involve reducing and increasing the quadrature current supplied to the induction machine.

196) The method of claim **195** wherein said step (pp) comprising

ss) Reducing the quadrature current supplied to the induction machine, until the synchronous speed being above the operating speed of the generator, where the generator being configured to be capable of acting as a motor,

and wherein said method further comprising the step of

tt) sourcing power from an auxiliary power supply, whereby causing the generator to act as a motor.

197) The method of claim **196** further comprising employing the generator as a starter motor for said prime mover.

198) The method of claim **196** further comprising

uu) sensing when the prime mover is involved in a substantially non-power producing section of its power production cycle, and,

vv) reducing the quadrature current to below the synchronous speed of the prime mover-generator combination, during periods when the prime mover is producing substantially no power other than inertia, whereby causing the generator to power the prime mover during non-power producing periods of the prime mover.

199) The method of claim **198** further comprising employing the generator as a starter motor for said prime mover.

200) The method of claim **198** further comprising the step of

ww) permitting the natural induction machine generator to motor transition during power output cyclic variations of the prime mover, whereby the generator may act as a motor during periods of low or zero power outputs of the prime mover.

201) The method of claim **200**, further comprising the step of employing the generator as a starter motor for said prime mover.

202) The method of claim **198** wherein the generator having substantially unstable torque equilibrium and further comprising the step of

a) upon the substantial achievement by the prime mover of the commanded output increase, decreasing the synchronous speed to a synchronous speed which is part of a generator torque versus speed curve in which, at the commanded prime mover output, the torque load of the generator is equal to the torque output of the prime mover.

203) A method for controlling the output of a prime mover comprising

a) allowing the prime mover to vary its intake and speed and output due to its torque load, and
b) receiving signals regarding a required power output increase; and,
c) adjusting the torque load on said prime mover so as to cause the required power output increase, and,
d) receiving signals regarding a required power output decrease; and,
e) adjusting the torque load on said prime mover so as to cause the required power output decrease.

204) A system comprising a generator, an engine, supplying power only to said generator, and a positive incremental load having a large increase of current draw to voltage input increase relation, over part or all of its operating range, connected to said generator, whereby said load stabilizes the operation of said engine and generator.

205) The system of claim **204** wherein said load has a limit on how much current it can draw from the generator, whereby preventing generator overload.

206) The system of claim **204** wherein said load has a threshold below which it draws little or no current.

207) The system of claim **204** wherein said generator is selected from the group consisting of direct current generators, synchronous generators, and alternating current induction generators that do not have fixed excitation frequency.

208) The system of claim **204** wherein said system further comprises energy storage connected to said positive incremental load, and wherein said

load is capable of current sourcing, and wherein said generator is capable of motor operation.

209) The system of claim **208** wherein said generator is selected from the group consisting of: brush comutated direct current generators, brushless direct current motors modified with suitable back diodes so as to be capable of generator operation, direct current generators having independent excitation in which the generator is caused to act as a motor by reversing the flow of armature current through the machine, induction generators configured to operate also as motors.

210) The system of claim **208** wherein said positive incremental load is connected to said energy storage via a boost and a buck converter.

211) The system of claim **208** wherein said positive incremental load is programmed to source current from the energy storage below a threshold voltage.

212) The system of claim **211** wherein said the threshold voltage is adjustable and further comprising an input to indicate when more or less power is required, connected to the adjustable threshold voltage, for the adjustment whereof, whereby power flow between generator and load would be altered, causing a variation in engine power output.

213) The system of claim **212** wherein said input comprises the position of an accelerator pedal in a vehicle, and wherein said energy storage is connected to a motor for driving said vehicle.

214) The system of claim **212** wherein said input comprises a reading of the depth of discharge of said energy storage, or of the rate of depth of discharge of said energy storage.

215) The system of claim **212** used as the source of electrical power for an off-grid electricity generation unit.

216) The system of claim **212** further not comprising a separate starter motor to start said engine's operation.

217) An engine, a generator connected thereto having a multiple of phases greater than 3, or preferably greater than 30, and a generator controller for varying the number and strength of poles developed in the magnetic field of the generator and thereby varying the synchronous speed of the generator, said generator controller forming a control mechanism for the power output of the engine.

218) The apparatus of claim **217** wherein said generator controller further for varying the frequency of the excitation current of said generator, for increased control over the synchronous speed of the generator.

219) An induction generator/motor, being supplied with energy by a prime mover, having a very steep torque/speed relationship about its synchronous speed.

220) The induction generator/motor of claim **219** wherein said very steep torque relationship about its synchronous speed is limited to said generator switching from maximum motoring torque to maximum generating torque and vice versa when the speed changes by less than 12 radians per second.

221) The induction generator/motor of claim **218** further comprising a generator controller for controlling the synchronous speed of the generator to vary the power output of the prime mover.

222) A method for substantially maintaining an engine's speed during power absorbing strokes of said engine, comprising connecting said engine to a generator/motor having a very high torque versus speed relationship, whereby said generator will act as a motor during power absorbing strokes of said engine, helping to maintain the engine's speed during those time periods.

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